ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

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CCCCXLVI.—BOTANICAL GARDENS IN SOUTH AFRICA.

In the *Kew Bulletin* for January 1892, pp. 10–14, the change made in the character and function of the Botanic Garden at Cape Town was noticed. This institution was no longer to be a Botanic Garden, but simply a town garden supported by municipal rates. The change at Cape Town has now been followed at King William's Town, in the Eastern Province of the Colony. This garden was under the charge of Mr. Thomas R. Sim, a capable horticulturist, who was formerly trained at Kew. During his residence in South Africa Mr. Sim published a very useful work on "The Ferns of South Africa, containing descriptions and (159) figures of the ferns and fern-allies, with localities and cultural notes." [London: Wesley & Son, 1892.] More recently he has printed a "Check list of the indigenous plants of Kaffraria."

Consequent upon the change in the control of the garden at King William's Town, Mr. Sim has now left it, and accepted an appointment under the Forest Department.

The history of the Botanic Gardens in South Africa shows that they differed in many ways from such institutions as they exist in other countries. The Cape gardens were only partially supported by Government, and they had to look to receipts from the sale of seeds and plants to meet their current expenditure. The position is described in the *Annual Report* of the Cape Town Botanic Garden for 1883, p. 1:—"The garden is kept going mainly by the mercantile profits of the seed store. Its income, and consequent power to repair, rebuild, and improve, decrease as business stagnates. There is no elasticity in the revenue except in that which comes of our commercial earnings. The grant from Government remains the same, though meted out in accordance with the poverty of the Colony in 1849. The subscription list has never kept pace with the great increase of the population of Cape Town." Conducted on these lines it was inevitable that the gardens should be regarded as interfering unduly with private enterprise, while their scientific character was completely overlooked. A properly equipped Botanic Garden, devoted to scientific work and carrying on experimental cultivation, appears never to have existed in Cape Colony.

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Mr. John Horne, F.L.S., when Director of the Forests and Botanic Gardens of Mauritius, visited the Cape in 1883. His impressions of the Botanic Gardens were as follows:—

"When in Africa I travelled from Algoa Bay overland to Cape Town by post cart and train. I visited all the Botanic Gardens at the Cape, namely, Port Elizabeth, Graham's Town, and Cape Town. They, in many respects, are most disappointing, being Botanic Gardens merely in name. The directors and curators are not to blame for this, but the gardens have to justify their existence and support themselves by the sale of plants. They are simply nursery establishments, and the stock on hand generally speaking is such as one finds in the nurseries at home, stove or tropical plants excepted. They seem to supply a want, the Graham's Town one especially, in supplying the colonists with flowers, shrubs, and useful fruiting and flowering trees. Should, however, a stranger like myself, wish to see African plants he need not look in these gardens for them. There are not many of them in any of these gardens. He must go to the 'Bush' and the 'Veldt' to find them. This surprised me very much indeed. For many of these are far prettier than a great deal of the flowering exotic 'stuff' which is introduced, grown and propagated with so much pains and trouble. And many of them are far more interesting from their grotesque appearance and as botanical curiosities (if one may use the expression) than are to be found in any other country, the Cacti of Mexico perhaps excepted."

The Cape Gardens have hitherto had little to do with the introduction and distribution of economic plants or the dissemination of information respecting such subjects for the use of the general community.

What has been attempted in this direction was owing entirely to the personal efforts of the curators. The following extract from Professor MacOwan's *Report* for 1883, pp. 3–4, shows how much more might have been accomplished if the funds at his command had allowed:—

"The garden has been able to supply many demands made upon it by similar institutions at home and abroad and numerous private collectors, for things scarcely in the usual run of trade supply, partly gratis and partly by sale. Thus duplicate palms and other fine conservatory plants have been furnished to the Port Elizabeth Park Committee, vine-cuttings on a large scale for experimental viticulture in the Transkei, seeds of *Cinchona ledgeriana* to most of the Cape Botanic Gardens, Olives, *Reana*, and *Sorghum* to many private planters. Several enterprising cultivators are now, at our suggestion, trying to multiply the thornless *Opuntia* and the *spek-boom* in Namaqualand, Angra Pequena, and elsewhere. I think these excellent food plants have not received the attention they deserve. Of course they are special food plants, suited to special localities, and do not come into competition with the ordinary *veldt-bosjes* and grass wherever the climatic conditions permit the usual pasturage. But I am sure that should the *spek-boom* be incapable of acclimatisation on the sun-smitten randts of Namaqualand, the *Opuntia* may be grown in vast thickets at the junction of rock and sand veldt, and its use would save much of the present expenditure in importing compressed hay for trek-cattle. Such culture throughout all karroid districts of the Colony subject to frequent failure of seasonable rains is far more important than the introduction of any more of the fancy staples which are from time to time proposed, praised, and forgotten, and which have given point to the proverbial sneer that "the Cape is a country of samples." I wish it could be added that these supplies and others to the Government Forest Department were all made gratis.

Unfortunately the garden has *to sell in order to live.* We have therefore to demand money for exactly those things which are raised for free distribution in every Colony except ours. But in every Colony except ours the Botanic Gardens are entirely maintained by the State, enjoy the serene independence which enables them to give out of their abundance, and know nothing of the perpetual fight against insolvency which we share with the small shop-keeper.

"The demand for information on points of culture and introduction of new experimental plants is incessant. A few of these inquiries have reached us through the Government, and have been dealt with in quasi-official reports, but the mass of them come in the ordinary correspondence of the garden, and absorb a great amount of time *without any return.* Inquirers are often inconsiderate. Sometimes several letters involving research are required, our advice is taken, and is carried out at a rival seed store. We have not the right of franking such correspondence, and almost invariably have to pay the postage for our pains. It is a pity that the bulk of the inquiries shows a tendency to try tropical and sub-tropical cultures for which the climatic conditions of the Cape are prohibitive, and the available labour too high priced. Cacao, arrowroot, ginger, opium, *Cinchona*, tea, *Furcræa* fibre, *Phormium* and rice; upon these and the like speculation has been rife. I wish there were the same curiosity about ascertaining the special fitness of this or that variety of wheat, barley, or maize for this or that soil, or about originating improved strains of potato from seedlings—anything, in fact, which will result in produce rather than in samples. Occasionally important matters have turned up in course of correspondence. For example, the occurrence of the destructive *Cuscuta Trifolii*, Bab., or 'Dodder,' among colonial crops of Lucerne has been signalised. This mischief is, no doubt, a result of the importation of cheap unsifted seed. Whether the measures earnestly pressed upon the cultivators will be carried out to the extirpation of the pest remains to be seen. In view of the great value of Lucerne to the ostrich-farming industry, and the swift destruction of the crop by the parasite, should it become naturalised, I am of opinion that a stringent Act for the extirpation of *Cuscuta* is more needed than that against the *Xanthium spinosum.* In case of the latter, legislation perhaps sharing the proverbial blindness of justice, singled out for destruction the large grained burr-weed, but failed to denounce the smaller yet more mischievous *Echinospermum*, or 'carrot seed' of the farmers, the archimedian screw-twist of prickles borne by the *Medicago* for the confusion of wool-combers, and the brittle *Asparagus* of the Karoo, whose twigs tangle the mohair of our Angoras. It might be well to issue by authoritative proclamation a statement of the destructive effect of *Cuscuta* upon Lucerne and other leguminous crops, followed by details of the mode of stamping out the parasite, and a recommendation to magistrates and field-cornets to be on the watch for its appearance. Being introduced from Europe in imported seed, it may appear sporadically in any part of the Colony."

At the present moment Cape Colony is the only important British possession which does not possess a fully equipped Botanical Institution. It is true it possesses a fine colonial herbarium under the competent charge of Professor MacOwan and an agricultural department which he efficiently advises on botanical subjects. But beyond this it has no central authority dealing with the practical aspects of the science of botany, and no gardens under technical control where careful experi-

mental cultivation could be carried on or where special seeds and plants could be obtained for starting new industries. This condition of affairs is scarcely credible to a large and wealthy community like that at the Cape. The town gardens now established in the more important centres of population in Cape Colony are likely to be useful as breathing spaces, and as ornamental adjuncts to public buildings. As purely pleasure gardens, supported by the municipality out of the local rates, they will also have their own special value. It was entirely a misnomer to call them Botanic gardens, and it is as well that the name was changed and their proper character officially recognised.

Something, however, more than an ornamental garden, dotted here and there, is required in South Africa. A central establishment in the neighbourhood of Cape Town devoted to the scientific study and experimental cultivation of plants, fully equipped to discharge its studies as a national institution on the lines of Kew, would alone be worthy of the future of South Africa.

The flora of this part of the world is one of extreme interest. It deserves to be carefully and exhaustively studied, and numerous plants, now in danger of becoming extinct, should be preserved in some central spot for the observation of students. Of the economic influences of such a central institution it is needless to enlarge. There are hundreds of problems connected with the cultivation of industrial plants in South Africa awaiting solution, and these could only be dealt with at an institution specially devoted to scientific research, where careful trials could be conducted extending over many years. As affording the most recent information on the subject, the following letter received from Mr. Thomas R. Sim, on resigning charge of the King William's Town Garden, is reproduced:—

CURATOR, BOTANIC GARDEN, KING WILLIAM'S TOWN, to ROYAL GARDENS, KEW.

Botanic Garden, King William's Town,
June 30, 1894.

DEAR SIR,

I HAVE to thank you for seeds received some time ago, but since I last wrote you. Since then we have been slowly but gradually progressing with the arrangements—of which I have spoken to you ever since I came out—for passing the garden into the care of the Borough Corporation, and now that is nearly accomplished. The garden will then become like those of Port Elizabeth and Cape Town, a town garden pure and simple, without any pretence of having a botanical or experimental connexion. In past years, though they had the botanical name, I cannot say that they had very much connexion with botany, except in so far as I myself chose to carry out studies during extra hours, and as the experimental work has been gradually given up here, as it was being taken up by the Agricultural Department, I think there is little reason to regret that one more of the Botanic Gardens is, as such, passing out of existence, and taking the name and character which would have better suited it for the greater part of its existence.

Indeed, what we are in want of most is one really good botanical and experimental garden for the Colony, equipped so that it shall not have to earn any part of its own maintenance, and then allow each town to have its own town garden, public park, or whatever the local circum-

stances most demand. Meantime we have none such, and any endeavours made by me to develop the experimental side of this establishment have constantly been held in check by the stern necessity for first earning our bread and butter, and even in that our efforts have been stultified by the care of a swimming bath, on which we have lost 900*l.* during the past nine years or so during which it has existed.

The transfer will be effected in about two months time, and as I could not see any prospect of the place being worth holding, or of its offering any opportunity for good work, I have accepted an appointment in the Forest Department, in charge of the nurseries and plantations at Fort Cunynghame, by Dohne, which will be my address after September 1. The plantation is the most extensive one in the Colony, extending at present to about 1000 acres, and it is proposed to extend this to two or three times its present size in the near future. Attached to this is the nursery from which the public are supplied at cost rates, for the encouragement of tree planting, with young trees in large quantity. Also here are grown the vines imported by Government as Phylloxera proof or as stocks, and in various other ways the establishment is being made one of much public utility. The plantation is situated about 40 miles from here, further inland, and at an altitude of 2000 to 4000 feet, so I expect it to be much more healthy for my family than King William's Town has been.

I enclose a packet of *Microstephium*, a white-leaved plant, which may be of use along the south coast of England in bedding work.

(Signed) Thos. R. Sim.

CCCCXLVII.—DECADES KEWENSES.

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS XIV.

The following Decade is devoted to new species of ferns contained in the interesting collection made in Yunnan, Western China, by Mr. W. Hancock, F.L.S., already referred to in the *Kew Bulletin* (1895, page 45).

131. **Davallia (Leucostegia) pulcherrima**, *Baker* [Filices] : rhizomate breviter repenti, paleis basalibus lineari-subulatis sordide brunneis, stipitibus contiguis elongatis gracillimis nudis castaneis, frondibus oblongo-deltoideis parvis decompositis glabris viridibus modice firmis, pinnis lanceolatis basi inferiori cuneato-truncatis inferioribus haud reductis, segmentis ultimis linearibus uninerviis dissitis erecto-patentibus, soris oblongis ad vel infra apicem segmentorum ultimorum costalibus, indusio transversaliter oblongo lato glabro membranaceo persistente.

Habitat.—Yunnan; crevices of rocks near Mongtse, alt. 6000 feet, *Hancock*, 105.

Stipites 1–4 poll. longi. *Lamina* 2–4 poll. longa, deorsum 1½–2 poll. lata, segmentis ultimis ¼ lin. latis.

A very pretty little species, with the habit of a *Darea*, nearly allied to *Davallia Clarkei*, Baker, which has also been found in Yunnan.

132. **Cheilanthes (Eucheilanthes) Hancocki**, *Baker* [Filices]; paleis basalibus linearibus firmis castaneis, stipitibus elongatis fragilibus castaneis supra basin nudis, frondibus deltoideis glabris membranaceis decompositis utrinque viridibus, rachibus castaneis nudis, pinnis infimis reliquis multo majoribus dimidio inferiori valde producto, segmentis ultimis oblongis obtusis erecto-patentibus, soris contiguis, indusio membranaceo glabro orbiculari vel oblongo.

Habitat.—Yunnan, in shady glens near Mongtse, *Hancock*, 63.

Stipites 4–10 poll. longi. *Lamina* 5–6 poll. longa et lata.

Intermediate between the common Tropical Asiatic *C. tenuifolia*, Swartz, and the Japanese *C. Brandtii*, Franch. et Savat.

133. **Cheilanthes (Aleuritopteris), albofusca**, *Baker* [Filices]; paleis, basalibus lanceolatis firmis castaneis, stipitibus elongatis gracillimis nudis castaneis, frondibus firmis parvis deltoideis tripinnatifidis facie viridibus dorso albo-ceraceis, pinnis infimis reliquis multo majoribus dimidio inferiori valde productis, segmentis ultimis oblongis erecto-patentibus, soris crebris continuis, indusio lato brunneo continuo glabro persistente.

Habitat.—Yunnan; crevices of rocks near Mongtse, alt. 5700 feet, *Hancock*, 126.

Stipites 1–3 poll. longi. *Lamina* 2–3 poll. longa et lata, segmentis ultimis $\frac{1}{2}$–1 lin. latis.

A pretty little silver fern, intermediate between *C. farinosa* and *C. argentea*. We also have specimens, collected in Yunnan by Delavay.

134. **Polypodium (Phegopteris) dissitifolium**, *Baker* [Filices]; paleis basalibus magnis lanceolatis membranaceis ferrugineis, stipitibus nudis elongatis stramineis, frondibus oblongo-lanceolatis bipinnatifidis glabris modice firmis utrinque viridibus, pinnis lanceolatis caudatis profunde pinnatifidis inferioribus haud reductis brevissime petiolatis, pinnulis oblongis dentatis, venis pinnatis venulis 5–6 jugis simplicibus erecto-patentibus, soris marginalibus confertis parvis globosis superficialibus.

Habitat.—Yunnan, in a deep ravine near Mongtse, *Hancock*, 45.

Stipites pedales et ultra. *Lamina* sesquipedalis, deorsum 5–6 poll. lata, pinnis inferioribus basi 4–5 lin. latis.

Near the Tropical African *P. obtusilobum*, Desv.

135. **Polypodium (Phegopteris) apicidens**, *Baker* [Filices]; paleis basalibus lanceolatis membranaceis ferrugineis, stipitibus elongatis gracillimis nudis stramineis, frondibus oblongo-lanceolatis bipinnatifidis modice firmis utrinque viridibus glabris, pinnis lanceolatis caudatis profunde pinnatifidis inferioribus haud reductis brevissime petiolatis, venis pinnatis venulis 6–8 jugis simplicibus, soris parvis globosis superficialbus intramarginalibus.

Habitat.—Yunnan, in deep shady glens near Mongtse, *Hancock*, 87.

Stipites pedales. *Lamina* 8–12 poll. longa, 3–6 poll. lata, pinnis inferioribus 5–6 lin. latis.

Nearly allied to *P. obtusilobum* and the last species.

136. **Polypodium (Phegopteris) sphæropteroides**, *Baker* [Filices]; stipitibus elongatis stramineis paleis deflexis ovatis brunneis membranaceis vestitis, frondibus magnis deltoideis decompositis viridibus submembranaceis junioribus utrinque pubescentibus adultis calvatis, rachibus stramineis, pinnis pinnulisque oblongo-lanceolatis, segmentis ultimis oblique oblongis obtusis erecto-patentibus, venis in segmentis ultimis furcatis vel subpinnatis, soris parvis globosis superficialibus in segmentis ultimis sæpissime solitariis.

Habitat.—Yunnan; forests of the Great Black Mountains, near Mongtse, alt. 8500 feet, *Hancock*, 119.

"*Frondes* 5–7 pedales." *Pinnæ* infimæ 15–18 poll. longæ, 5–6 poll. latæ, pinnis 15–18 lin. latis, segmentis ultimis $\frac{1}{2}$ lin. latis.

A large finely-cut plant, allied to *P. ornatum*, Wall.

137. **Polypodium (Phymatodes) macrosphærum**, *Baker* [Filices]; rhizomate late repenti calvato, stipitibus brevibus nudis, frondibus lanceolatis simplicibus subcoriaceis facie viridibus nudis dorso pallide viridibus paleis paucis sparcis peltatis brunneis membranaceis decoratis, venis primariis gracilibus flexuosis intra marginem dissolutis, venulis intermediis copiose anastomosantibus, soris magnis globosis marginalibus superficialibus supra medium laminæ præsertim productis.

Habitat.—Yunnan, on limestone rocks, near Mongtse, alt. 6200 feet, *Hancock*, 49.

Stipites 1–6 poll. longi. *Lamina* pedalis vel sesquipedalis, medio 12–15 lin. lata.

Near *P. longifolium*, Mett. and *P. angustatum*, Sw.

138. **Polypodium (Phymatodes) subimmersum**, *Baker*; [Filices]; rhizomate breviter repenti, frondibus subsessilibus contiguis linearibus integris glabris viridibus subcoriaceis e medio ad basin et apicem sensim attenuatis, venulis immersis occultis anastomosantibus, soris subimmersis oblongis vel globosis marginalibus vel leviter intermarginalibus remotis inter costam et marginem uniseriatis.

Habitat.—Yunnan, on the Great Black Mountains, on trunks of trees, alt. 9000 feet, *Hancock*, 92.

Lamina pedalis vel sesquipedalis, medio 5–6 lin. lata.

Nearly allied to the Australian and Polynesian *P. Brownii*, Wickst.

139. **Polypodium (Phymatodes) griseo-nigrum**, *Baker*; [Filices]; rhizomate repenti, paleis dense imbricatis lanceolatis firmulis sordide brunneis, stipitibus erectis elongatis nudis castaneis, frondibus coriaceis glabris oblongis parvis simpliciter pinnatis, rachi castaneo ad basin angustissime alato, pinnis lanceolatis subintegris basi dilatatis decurrentibus fertilibus subobtusis sterilibus obtusis, venis primariis nigris erecto-patentibus parallelis ad marginem rectis perspicuis, venulis anastomosantibus, soris magnis globosis superficialibus uniseriatis.

Habitat.—Yunnan, on grassy mountain slopes, alt. 6300 feet, *Hancock*, 67.

Stipites 8–9 poll. longi. *Lamina* 4–6 poll. longa, 2–3 poll. lata, pinnis basi 4–5 lin. latis.

Near *P. ebenipes*, Hook.

140. **Polypodium (Pleuridium) arenarium**, *Baker* [Filices]; rhizomate late repenti, paleis densis patentibus membranaceis lanceolatis ferrugineis, stipitibus elongatis strictis nudis stramineis, frondibus lanceolatis simplicibus rigide subcoriaceis facie viridibus dorso glaucescentibus, venis primariis perspicuis erecto-patentibus intra marginem dissolutis, venulis intermediis copiose anastomosantibus, soris magnis globosis superficialibus inter costam et marginem uniseriatis medialibus inter venas primarias solitariis.

Habitat.—Yunnan, on sandstone amongst grass near Mongtse, *Hancock*, 44.

Stipites 4–5 poll. longi. *Lamina* 6–8 poll. longa, 5–7 lin. lata.

Very near the New Caledonian and Australian *P. lanceola*, Mett.

CCCCXLVIII.—BOTANICAL SURVEY OF INDIA.

A scheme for carrying out the botanical survey of India was published on February 26, 1891, by the Government of India. It is under the control of Dr. George King, F.R.S., C.I.E., Superintendent of the Royal Botanical Gardens, Calcutta, who is Director.

Under his direction the publication of "Records of the Botanical Survey of India" has been commenced and four numbers have been issued.

The report of a botanical tour in Kashmir during 1893 by Mr. J. F. Duthie, F.L.S., Director of the Botanical Department of Northern India, forms No. 3. It is accompanied by a map showing the parts of Kashmir, Baltistan, and Gilgit visited by Mr. Duthie in 1892 and 1893.

No. 4 contains the notes of a journey from Haveri to Kumta, in Bombay, by Mr. G. Marshall Woodrow, Lecturer on Botany at the College of Science at Poona; and of a tour in Travancore by Mr. M. A. Lawson, F.L.S., Government Botanist, Madras. During 1893 the route taken by Mr. Duthie was from Rawal Pindi to Gulmarg and the Liddar valley, thence over the watershed by the Yamharu pass into the Sind valley, and over Toji La to Drás. From Dras the route was along the little-frequented road to Gurais *viâ* Tilail, thence over the Dorikun pass to the Deosai plains and back by the same route. The following extracts are taken from Mr. Duthie's report:—

Beyond the valley above Chatpani, Mr. Duthie states:—

"We had now reached an elevation of about 13,000 feet, and as the ground looked very promising for botany, I decided to halt here for the night, so as to have the whole of the next day for studying the vegetation of the pass. I collected a great number of plants and seeds that evening at the head of the valley.

"The next day (August 30th) was beautifully fine, with a cloudless sky. The top of the pass was soon reached by a steep but easy path over turf. The elevation of this pass is close under 14,000 feet. I can find no name given for it in any maps, but it is known by the Drás people

as the Kargeh pass. The view looking down the valley towards Tilail, is very fine, with Nanga Parbat in the distance. On the pass itself there was very little snow, and the turf was studded with brilliantly-coloured alpine flowers." (pp. 31 and 32.)

"At the lower and western end of the Gurais valley, where the river begins to turn southwards in the direction of Kanzalwán, is a remarkable forest composed chiefly of the white poplar (*Populus alba*); and about a quarter of a mile lower down the valley, and on the same side of the river (the left bank), there is a similar piece of forest. The trees are growing close together, and when viewed from the steep hill above, their tops present a level mass of compact foliage, a few individual trees projecting here and there. The chief interest attached to this forest is the large size of the trees, their average height being over 100 feet. Mr. W. Mitchell, who happened to be at Gurais at the time, kindly assisted me in making some measurements. The largest specimen we could find was 127½ feet high and 16 feet in girth at 7 feet from the ground. In the 'Forest Flora of North-west and Central India,' Sir D. Brandis gives the maximum size of *Populus alba* in India as 40 feet in height and 8 feet in girth.

"The undergrowth of this forest is composed chiefly of a tall handsome *Senecio* (*S. chenopodifolius*) and a low-growing kind of bramble. A few isolated specimens of pine, spruce, and silver fir are met with; also *Populus ciliata*, two species of willow, *Cratægus Oxyacantha*, *Viburnum fœtens*, and *Hippophae rhamnoides*; this latter forms large thickets a little higher up the valley." (p. 34.)

The furthest point reached into the Deosai plains was the mountain lake of Shersan, very deep, and said to contain fish. The weather was abnormally warm for the elevation, and the vegetation was dried up.

"I returned to Chilam the next morning, and on the following day (17th) crossed the Dorikun pass in a storm of wind and sleet, and reached Minimarg the same evening. I halted here for a day to dry the tents, and this gave me an opportunity of exploring some forest ground on the further side of the stream. The most interesting discovery here was that of *Pyrola secunda*, a species which had not been recorded for India previous to my finding it in the Astor valley in 1892. The undergrowth in this forest is composed chiefly of a variety of *Rubus niveus*, with red fruit tasting exactly like that of the raspberry, and of black-currant bushes with their branches bent down with the weight of the fruit. Another kind of bramble (*R. saxatilis*), with scarlet fruit, is also abundant here. The natives call it '*popé*.' A large number of interesting mosses were collected here." (p. 36.)

Among the notes on some of the economic plants met with in Kashmir and in the districts of Baltistan and Gilgit Mr. Duthie mentions the following:—

"*Ferula jaeschkeana*, Vatke; vern. *Apatkanphur* (Sind valley), *kangwa* (Pir Panjál).—A tall, handsome, umbelliferous plant, with yellow flowers, abundant in most of the valleys in Kashmir. This plant was at one time supposed to be a source of '*asafœtida*.' It resembles *F. Narthex*, Boiss., but has much larger fruit. The plant is said to be eaten by sheep and goats.

"*Ferula Narthex*, Boiss. (Narthex Asafœtida, *Falc.*)—Abundant in the Astor valley below Doian. I remember when on my way to Gilgit noticing this plant, only the dry bleached stems being then visible. There is a specimen in the Saharanpur herbarium collected by Dr. Giles

in 1886, and probably from the same locality. I agree with Dr. Aitchison in considering this to be the plant which Dr. Falconer supposed to be the true source of the drug. The root is full of a resin which has a powerful scent of *asafœtida*. The plant is figured in the *Botanical Magazine*, t., 5168, and in Bentley and Trimen's *Medicinal Plants*, t. 126." (p. 40.)

"*Stipa sibirica*, Lamk.—This, which is known as the poisonous grass of Kashmir, is very abundant in some of the valleys, especially on the outskirts of the forests at an elevation of 8000 to 9000 feet. It occurs also in other parts of the Himalaya; and on the Black mountain in Hazara it was the cause of much sickness amongst the baggage ponies during the expedition of 1888. The direct cause of its injurious effects on animals has not yet been conclusively shown. Some attribute it to a narcotic principle inherent in the plant, whilst others affirm that it acts mechanically as an irritant, and is not in any way chemically poisonous. Dr. Aitchison, who has given much attention to the subject, and has witnessed many cases of ponies having been poisoned by eating this grass, believes that the symptoms are produced by some kind of narcotic poison. A common remedy in Kashmir for this complaint, Dr. Aitchison tells me, is to hold the animal's head in the smoke of a fire, in order to produce a discharge from the nostrils, after which the dangerous symptoms disappear, and the animal recovers consciousness. In addition to this treatment, vinegar and sour apples are sometimes given. The cattle of the country do not of their own accord eat this grass during the spring and summer, but in the autumn, Dr. Aitchison says, they do eat it. If this be so, it tells somewhat against the idea of the plant possessing only mechanically irritant properties, for during the autumn months the rough awns of the spikelets are fully developed." (p. 43.)

CCCCXLIX.—TEA CULTIVATION IN THE CAUCASUS.

Experiments with tea plants in the Russian province of Transcaucasia have been carried on for some time. In the Russian *Nouvelles* quoted by the *Board of Trade Journal* (1891, p. 174), it was stated that "the tea plant flourished on the western littoral of Transcaucasia, notably at Soukhourn. The tea shrubs planted in those districts reach normal dimensions and arrive at full maturity, producing excellent seeds. The climate of Western Caucasia compares favourably with that of the south-east of China. This analogy consists not only in the equality of the mean annual temperature of the two regions, but also in the quantity of rain which falls there and in the period (spring) when the rains are most abundant, a condition essential to the growth of the tea plant." It is added that a so-called Caucasian tea had been exhibited at the Nijni-Novgorod fair. "This was nothing else but *Vaccinium Arctostaphylos*, a kind of tea from Koporié, which only served to discredit the future plantations in Caucasia."

Latterly the tea plantations in the Caucasus have been extended, and "the quality of the tea produced is said to be good."

The Department of Crown Estates has appointed a Commission which will include the Inspector of the Imperial Domains in the

Caucasus, to proceed to India, Southern China, and Ceylon, with the object of thoroughly examining the methods of tea culture and curing in those countries. The Commercial Agent for the Appanage Department of the Russian Imperial Court has recently visited Kew to study the subject.

Some remarkable statistics as to the tea production of the world are given in a paper read by Mr. A. G. Stanton at the Society of Arts (*Journ.*, vol. 43, pp. 189–201). In 1883 the total consumption of tea in the United Kingdom was 170,780,000 lbs., or 4·82 lbs. per head of population. In 1894 these figures had risen to 214,341,044 lbs., or 5·53 lbs. per head.

The remarkable feature in the statistics is the way in which India and Ceylon have displaced China as a source of supply. Taking Mr. Stanton's per-centages, the proportions of the total supply stand as follows :—

——	China.	India.	Ceylon.
1883	66	33	1
1894	12	55	33

In 12 years Ceylon has pushed to the position at first occupied by India, and this almost entirely at the expense of China.

Mr. Stanton states :—"The annual consumption of tea in the civilised world, exclusive of the United Kingdom, is about 250,000,000 lbs. Of this quantity only about 30,000,000 lbs. are Indian and Ceylon." It is evident, then, that if Russian tea can be successfully placed upon the market, it will have, in the first instance at any rate, to compete with China tea. The new competitor is not likely seriously to affect British production.

As the experiment to grow tea in the Russian Empire possesses an interest in connexion with the large tea industries of India and Ceylon the following particulars are reproduced from the report for the year 1894 on the agricultural condition of the Batoum Consular district, lately forwarded to the Earl of Kimberley by Mr. Consul Stevens. [Foreign Office, Annual Series, 1894, No. 1481] :—

The tea plantations at Chakva, near Batoum, belonging to Messrs. K. and S. Popoff, tea merchants, of Moscow, have been considerably extended this year under the supervision of the Chinese tea planters, who were brought over in 1893; a large number, about 600, natives of the Caucasus, are also employed in working on the plantation of this firm.

In a letter to the "Caucasian Agricultural News," Mr. A. Solovtzoff, who for several years past has been cultivating tea on his estates at no great distance from the lands belonging to Messrs. Popoff, gives a somewhat interesting account of his experiences in the raising of this plant since the year 1884. He states that at that time his chief concern was the question of procuring tea plants for planting, he feared to order seed lest old seed should be sent, besides this the seed of tea contains a volatile oil in considerable quantity which, during a long voyage, would

be likely to evaporate, and thus the seed would have been rendered sterile. Even the seed raised at Chakva requires the greatest care and attention, as excessive dryness deprives it of the oil, and too much damp causes it to rot.

Eventually, however, he succeeded in obtaining a few plants which arrived at Batoum in the month of July 1885, together with some seedlings. The condition of both left much to be desired, as they had received but little care and water during their transit, and were to a great extent damaged by the Customs authorities, who used quicklime for the purpose of disinfecting them against the importation of Phylloxera. They were, subsequently, transported to Chakva, and with as little delay as possible planted on his property. At first they grew badly, and all the shrubs dried up, but some of the seedlings took, and from these he was able to develop his plantation.

The land chosen for the plantation was a red clayey soil, dressed with a thin coat of manure composed of thoroughly rotted leaves and branches, &c. that had fallen from the trees. After clearing away the manure the land was dug up for a depth of about 21 inches and the top soil was worked to the bottom.

The seeds ripen in the course of a year, and are gathered in the month of October, at which time the plant also flowers. The seeds, after being collected, are strewed with dry sand and are kept in earthenware vessels. In March they are damped with a solution of camphor, spirits and water, in order to force their growth. The seeds are left damped with this solution for some hours, and are then put back into the earthenware vessels, after being mixed with damp earth. In this earth the seeds begin to shoot up, and they are then transplanted into the nursery beds, the soil of which is the same as that of the plantation, but which has a certain proportion of sea sand admixed for the purpose of rendering it more friable. The seeds are sown at a distance of $3\frac{1}{2}$ inches apart at a depth of $1\frac{3}{4}$ inches. As soon as the young shoots make their appearance above ground it is necessary to cover them over with mats in order to protect them from the excessive heat of the sun; but this protection should be removed in rainy weather and at night. In dry weather the young seedlings have to be watered once a day, and under this system of cultivation it is found that every seed comes up. Mole crickets, however, create great havoc among the seeds. These insects, Mr. Solovtzoff says, are the only enemies of the seedlings with which he has to contend, and they are most difficult to deal with, although it would appear he has found means whereby the ravages caused by mole crickets may be minimised. The methods which he adopts to attain this end are the annual removal of the nursery beds to fresh ground, and the burying in the nursery beds, in a line with the burrows of the crickets, of grains of Indian corn boiled in a solution of arsenic, or, what is still better, a solution of corrosive sublimate.

The propagation of the tea plant by means of cuttings should be avoided, as a large proportion of the cuttings do not take, but the chief objection is that those that do only produce very weak plants.

Now that he has an almost unlimited supply of seedlings, Mr. Solovtzoff intends transplanting only the stronger ones into the plantation. The seedlings remain in the beds a whole year, and are then planted out 4 feet apart from each other.

The only attention which the plantation requires is that it should be freed from weeds twice a year. For the first year the young plants should be protected from the rays of the sun by the branches of trees. It has not yet been found necessary to artificially water the plants in the

plantation. Up to the present, pruning, with a view to increasing the crop of leaves, has not been resorted to, as the chief object has been to obtain as large a quantity of seed as possible for the multiplication of the plants. No manure has been used hitherto, but when planting out the seedlings this year it was intended to manure the soil with timber ashes and refuse from oil mills.

During the dry season, May and June, when the heat is very great, the grown up plants stand the climate very well, but, as mentioned before, the young plants have to be protected from the sun. The winter of 1892–93 was exceptionally rigorous, the frosts being as severe as six degrees Reaumur, but neither the grown up plants nor the seedlings suffered in any war, although the latter were for several days covered with snow up to the very leaves. This result is particularly gratifying when the fact that the very young seedlings are planted in a quite open and low-lying plain fully exposed to the wind, is taken into consideration; when subsequently transferred to the plantation they do very well.

The plantation covers about five acres, and as planting has been carried on as seed has become available, it contains plants of all sizes, ranging from five years' growth to one and a half years' growth. The number of plants was 5150, and about 8000 seedlings were to be planted out during the present year, there is a sufficient quantity of seed in stock to raise 40,000 more seedlings, and the quality of the tea is said to be good.

It is also reported that about 43,000 acres of Government land in the neighbourhood of Chakva have recently been purchased by the Department of Crown Estates for the purpose of turning them into tea plantations, and in connexion with this, the above Department has ordered a Commission, which will include the Inspector of Imperial Domains in the Caucasus, to proceed, at the end of this year, to India, Southern China, and Ceylon, with the object of thoroughly studying the methods of tea culture in those countries.

CCCCL.—VACCINUM ARCTOSTAPHYLOS AS A TEA SUBSTITUTE.

With regard to the use of *Vaccinium Arctostaphylos* as a tea substitute in the Caucasus referred to in the preceding article, the following note contributed by the Director to the *Pharmaceutical Journal*, for March 21, 1885, is reproduced, to complete the history of the subject:—

Mr. Holmes's note in the *Pharmaceutical Journal* (January 17, pp. 573–4) pretty well exhausts the history of this curious product. But it will be convenient to record in the same pages the few other facts that have come under our notice at Kew.

In 1877, Mr. George Maw, F.L.S., brought from Asia Minor a small sample of tea obtained at Broussa in Anatolia. Mr. Maw informed us that it was sold for about 8*d.* per pound, and he ascertained that it was made from *Vaccinium Arctostaphylos* (*see* "Kew Report," 1877, p. 45). Mr. Holmes mentions on the authority of Mr. Allen, that in Lazistan and Trebizond it was first made in 1877; but in that year, at any rate in Anatolia, its use seems to have been sufficiently common to attract Mr. Maw's attention.

The tea next came under our notice in the report by Consul Biliotti, "On the town and port of Samsoon, and on the Circassian colony in the district."* Mr. Biliotti states that the Circassian families "consume large quantities of sugar and have introduced the use of tea; but there being a sort of native tea produced at Amassia and Tokat, the yearly importation of this article from Great Britain does not exceed 1500 pounds." We thought it was worth while drawing the attention of the Foreign Office to the matter, with a view of ascertaining the nature of this tea substitute. Mr. Biliotti took a good deal of trouble, and obtained and forwarded to Kew specimens of tea and of the plant producing it from Amassia and Tokat, in the province of Roum, and also from Rizeh in Trebizond. Writing from Trebizond, he says:—"As it grows profusely here wild on high mountains (not below an altitude of 500 feet, so far as I have been able to ascertain), it would be of invaluable advantage for the population to know whether the plant belongs to the genus tea, and whether cultivation would improve the quality of the tea now produced, which lacks in flavour. This may also be due to the natives using unskilful means for drying the leaves."

The tea sent has exactly the appearance and aroma of coarse black tea; so much so, that the Customs authorities insisted on charging duty upon it.

The specimens sent were identified by Professor Oliver as *Vaccinium Arctostaphylos*, without hesitation. He remarks that the plant is figured by Tournefort in his "Voyage in the Levant"; but though that traveller mentions the taste of the leaves, he says nothing about its being used as tea. This confirms what Mr. Holmes says as to its use for this purpose being a practice of recent date.

The Board of Trade, to whom samples of the tea were communicated, submitted them to Messrs. George White & Co., the well-known firm of tea brokers. They remark that common China tea, selling at 5½*d.* to 6*d.* per pound, shows better value in every respect, and the admixture of the "Trebizond tea" could hardly reduce the cost, while it would certainly not improve its flavour.

Though the aroma of the "Trebizond tea" was so agreeable, the taste of a decoction was harsh and mawkish, with no appreciable resemblance to that of true tea. I sent a sample to Dr. Schorlemmer, of Owens College, Manchester, who has paid some attention to the chemistry of tea-substitutes. *Ledum palustre*, belonging to the next natural family, *Ericaceæ*, yields Labrador tea, and it seems odd that two nearly related plants should be pitched upon in such distant parts of the world for the same purpose, if there were no physiological basis for their selection. But I have not heard whether Dr. Schorlemmer has detected any principle in Trebizond tea which would account for its extensive use.

Since the above was in type we have been favoured by the Board of Trade with a copy of a memorandum (dated January 15, 1885), by M. Numa Doulcet, H.M. Vice-Consul, at Samsoon.

I append a translation which, I think, finally exhausts the subject:—

1. The tea in question became a commercial article in 1880; at first its consumption was limited to the country and particularly to those districts in which Circassian colonies had been founded.
2. It is manufactured by Circassian planters in the neighbourhood of Amassia, Tokat, and Horek, all in the province of Roum, at a short distance from the forest which clothes the mountain

* "Commercial Reports from Her Majesty's Consuls, 1884," Part. I., p. 147.

chain called Beldagh, and on which the plant which furnishes the tea in question grows in great abundance.

3. I have not been able to ascertain the process of manufacture which takes place within the houses of the Circassian colonists who undertake this industry, and who appear to be pretty numerous.
4. There are several crops of tea; that which yields the best quality takes place in May. About 5000 ocques (the ocque=$2\frac{3}{4}$ lbs.) are actually manufactured annually, but this quantity could be considerably augmented if there were occasion for it.
5. When fit to yield a crop the plant has reached a shrubby state.
6. The tea is sold on the spot at about five piastres per ocque. The cost of transport to Samsoon might amount to about one piastre, which brings the price per ocque to six piastres in that town.
7. The consumption is almost limited to the requirements of the Vilayets of Sivaz (Roum) and Angora (Anatolia). It is to the town bearing the last-mentioned named that the greater part of the crop is sent. In 1881 a consignment was sent to France, but the transaction was not a profitable one. Some further consignments to Constantinople also do not appear to have been successful.

CCCCLI.—DIAGNOSES AFRICANÆ, IV.

(*Continued from p.* 129, 1894.)

The plants described below form part of a collection made by Mr. A. Carson, B.Sc., of the London Missionary Society, and presented by him to Kew. They are from a place called Fwambo, situated about 50 miles south of Lake Tanganyika, and evidently the greater part of them from a considerable elevation, as they are temperate and sub-tropical types. Mr. Carson's labels afford no information on this point however, but as the level of the lake is given as 2670 feet above the sea, and the plateau at 4000 to 5000 feet, with higher peaks, it is probable that these plants were from elevations of 5000 to 7000 feet.

The following extract from Mr. H. H. Johnston's account of the country (*Proceedings of the Royal Geographical Society*, xii., 1890, p. 737) is interesting:—

"The ordinary route to Tanganyika, which I had now picked up in the Mambwe country, leads you up through the most beautiful gorge of Fwambo to and through the mountain ranges which look down on the south end of Tanganyika. The gorge of Fwambo is an exquisite bit of scenery. A beautiful stream dashes down in many cataracts and rapids through a deep but not very narrow gorge between precipitous mountain sides, and this gorge is filled with magnificent forest of a truly West African character, an ideal tropical forest with its immense umbrageous trees, its graceful oil-palms, its parasitic orchids, and trailing swinging creepers."

140. **Oxalis trichophylla**, *Baker* [Geraniaceæ]; acaulis, annua, foliis omnibus radicalibus trifoliolatis longe petiolatis, foliolis oblongis obtusis

utrinque dense persistenter albido-pilosis, pedunculo elongato piloso, floribus paucis umbellatis, pedicellis cernuis calyce longioribus, sepalis oblongo-lanceolatis pilosis, petalis obovato-oblongis calyce triplo longioribus superne lilacinis inferne luteis, genitalibus distincte triseriatis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (56 of 1894 collection).

Foliola 4–5 lin. longa. *Pedunculus* 4–5 poll. longus. *Sepala* 1½–2 lin. longa.

Near *O. corymbosa*, DC. and *O. purpurata*, Jacq.

141. **Oxalis oligotricha**, *Baker* [Geraniaceæ]; annua, acaulis, foliis radicalibus dense rosulatis longe petiolatis trifoliolatis, foliolis membranaceis oblongis vel ovato-oblongis obtusis utrinque parce pilosis, pedunculo elongato, floribus paucis umbellatis, bracteis parvis lanceolatis pilosis, pedicellis brevibus, sepalis oblongo-lanceolatis pilosis, petalis lilacinis calyce triplo longioribus, genitalibus triseriatis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (1890 collection).

Foliola 12–21 lin. longa, 9–12 lin. lata. *Pedunculus* 4–6 poll. longus. *Sepala* 2 lin. longa.

Near *O. corymbosa*, DC.

142. **Impatiens assurgens**, *Baker* [Geraniaceæ]; perennis, caulibus simplicibus erectis glabris superne pubescentibus, foliis sessilibus lanceolatis argute serratis basi rotundatis inferioribus oppositis superioribus alternis, floribus solitariis axillaribus longe pedunculatis, sepalis lateralibus parvis ovatis, labello albido concavo ore obliquo calcare brevi gracili, petalis albidis obovato-quadratis, ovario glabro ad apicem et basin sensim attenuato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (11 of 1893 collection, 15 and 105 of 1894 collection).

Caulis 1–2 pedalis. *Folia* 1½–2 poll. longa, 3–6 lin. lata. *Pedunculi* 1½–2 poll. longi. *Labellum* 1 poll. longum. *Petala* 4 lin. lata.

143. **Impatiens gomphophylla**, *Baker* [Geraniaceæ]; perennis, caulibus erectis glabris superne parce pilosis, foliis alternis breviter petiolatis oblongis acutis argute dentatis basi cuneatis facie viridibus glabris dorso pallide viridibus ad venas primarias pilosis, floribus axillaribus geminis longe pedunculatis, sepalis lateralibus parvis ovatis rubellis, labello infundibulari calcare spiraliter recurvato, petalis parvis orbicularibus, ovario glabro e medio ad basin et apicem angustato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (10 of 1893 collection, 7 of 1894 collection).

Folia 2–3 poll. longa, medio 9–12 lin. lata. *Pedunculi* 12–18 lin. longi. *Labellum* 12–15 lin. longum.

Near the West African *I. bicolor.*, Hook. fil. in *Bot. Mag.* tab. 5366.

144. **Crotalaria laxiflora**, *Baker* [Leguminosæ]; annua, ramosissima, glabra, stipulis minutis, foliis breviter petiolatis trifoliolatis, foliolis oblanceolatis obtusis vel cuspidatis utrinque viridibus, racemis laxis paucifloris terminalibus, bracteis linearibus minutis, pedicellis brevibus

ascendentibus vel patulis, calyce tubo obconico dentibus lanceolatis tubo longioribus, petalis luteis, vexillo obovato calyce duplo longiore, legumine sessili subgloboso monospermo glabro.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (28 of 1894 collection).

Caulis subpedalis erecta. *Foliola* 4–8 lin. longa. *Calyx* 2 lin. longus. *Corolla* 4 lin. longa. *Fructus* 2 lin. longus.

Belongs to the group *Sphærocarpæ*, near *C. filicaulis*, Welw.

145. **Indigofera polysphæra**, *Baker* [Leguminosæ]; fruticosa, ramosissima, caule erecto angulato adpresse piloso, stipulis linearibus minutis, foliis simplicibus subsessilibus lanceolatis acutis rigidulis utrinque viridibus obscure pilosis, floribus in capitulis densis globosis copiose paniculatis dispositis, pedicellis brevibus dense pilosis, bracteis lanceolatis, calyce dense piloso tubo brevissimo dentibus linearibus elongatis, legumine oblongo-cylindrico dense piloso 2–3-spermo calyce sesquilongiori.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (70 of 1894 collection).

Folia 2–3 poll longa, 3–4 lin. lata. *Calyx* 2 lin. longus. *Fructus* 3 lin. longus.

Near *I. procera*, Schum. & Thonn.; and *I. djurensis*, Schweinf.

146. **Desmodium (Nicolsonia) tanganyikense**, *Baker* [Leguminosæ]; suffruticosum, caulibus angulatis dense pubescentibus, stipulis linearibus falcatis, foliis sessilibus trifoliolatis subcoriaceis facie viridibus obscure pubescentibus dorso dense pubescentibus, foliolo terminali oblongo obtuso integro basi rotundato, racemis laxis in panicula magna efoliata dispositis, bracteis minutis, calyce tubo campanulato dentibus acutis tubo æquilongis, vexillo obovato rubello calyce triplo longiori, legumine lineari pubescente breviter pedicellato articulis circiter 3 longioribus quam latis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (27 of 1894 collection).

Foliola 3–4 poll longa. *Panicula* pedalis, racemis inferioribus 5–6 poll. longis. *Calyx* 1½ lin. longus.

Near *D. senaarense*, Schweinf.

147. **Mucuna erecta**, *Baker* [Leguminosæ]; erecta, fruticosa, ramulis lignosis angulosis dense breviter pubescentibus, stipulis deciduis, foliis trifoliolatis distincte petiolatis foliolis rigidulis oblongis obtusis utrinque dense adpresse pilosis, floribus 2–4-nis axillaribus, pedicellis brevibus dense pilosis, bracteis minutis, calyce dense brunneo-piloso tubo campanulato dentibus tubo longioribus supremo ovato inferioribus ovato-lanceolatis, petalis nigrescentibus, vexillo calyce 2–3-plo longiori, carina acuta recurvata calyce 3–4-plo longiore, ovario cylindrico piloso multiovulato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (66 of 1894 collection).

Foliola 2 poll. longa, 9–12 lin. lata. *Calyx* 4 lin. longus. *Carina* 14 lin. longa. *Vexillum* 9–10 lin. longum. *Fructus* ignotus.

The only species previously known with erect stems is the *M. stans*, Welw.

148. **Dolichos lupinoides**, *Baker* [Leguminosæ]; perennis, caule erecto simplice vel furcato dense persistenter albo-sericeo, foliis propriis hysteranthiis ignotis, rudimentariis bracteiformibus ovatis, floribus in racemo elongato denso dispositis, bracteis linearibus pilosis, pedicellis brevibus pilosis, calyce piloso tubo campanulato dentibus superioribus parvis, inferiori lanceolato tubo longiori, petalis pulchre purpureis calyce duplo longioribus, ovario cylindrico multiovulato dense piloso.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (133 of 1893 collection).

Caulis pedalis. *Racemus* 6–9 poll. longus. *Calyx* 3 lin. longus. *Petala* 6–7 lin. longa, vexillum 6 lin. latum.

This curious species has the dense raceme of a Lupin. It flowers in November, and at that season the stems bear only a few rudimentary bract-like simple sessile clasping pilose leaves below the inflorescence.

149. **Dolichos pteropus**, *Baker* [Leguminosæ]; perennis, caulibus erectis pubescentibus, stipulis lanceolatis rigidulis caducis, foliis simplicibus rigidulis obovatis obtusis vel emarginatis utrinque tenuiter pilosis, petiolo ala lata foliacea apice semilunari prædito, floribus 1–4nis in racemo laxo efoliato dispositis, bracteis linearibus parvis, calyce piloso tubo campanulato dentibus acutis tubo æquilongis, petalis pulchre purpureis calyce 2–3-plo. longioribus, ovario cylindrico multiovulato dense piloso.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (94 and 117 of 1893 collection).

Caulis pedalis. *Folia* 12–15 lin. longa, ala petioli 4 lin. lata. *Calyx* 3 lin. longus. *Petala* 7–8 lin. longa.

Remarkable for the very curious foliaceous wing of the petiole.

150. **Dolichos xiphophyllus**, *Baker* [Leguminosæ]; perennis, caulibus erectis pilosis, stipulis lanceolatis magnis rigidulis persistentibus, foliis paucis linearibus simplicibus ascendentibus subcoriaceis utrinque viridibus pilosis ad basin sensim angustatis, floribus axillaribus longe pedicellatis, calyce piloso tubo obconico dentibus inæquilongis deltoideis tubo brevioribus, petalis pulchre purpureis calyce triplo longioribus, ovario cylindrico piloso multiovulato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (46 and 71 of 1893 collection).

Caulis pedalis vel sesquipedalis. *Folia* 6–8 poll. longa, medio 2–3 lin. lata. *Calyx* 2 lin. longus. *Petala* 6 lin. longa. *Fructus* ignotus.

Nearly allied to *D. simplicifolius*, Hook. fil. in *Bot. Mag.* tab. 7318.

151. **Pentas involucrata**, *Baker* [Rubiaceæ]; perennis, caulo elongato parce ramoso hispidulo, stipulis profunde laciniatis, foliis oppositis rigidulis paucijugis lanceolatis ad basin sensim angustatis utrinque viridibus glabris, cymis densis multifloris terminalibus globosis basibus dilatatis foliorum superiorum involucratis, dentibus calycinis magnis

subulatis, corollæ tubo cylindrico calyce duplo longiori, limbi lobis parvis lanceolatis, staminibus ex tubo exsertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (40 of 1894 collection).

Caulis sesquipedalis vel bipedalis. *Folia* caulina 4–6 poll. longa. *Dentes* calycini 3 lin. longi. *Corollæ* tubus 6–7 lin. longus; limbi lobi 3 lin. longi.

Remarkable for the manner in which the connate bases of the upper pair of leaves are dilated so as to form a cup which encloses the base of the inflorescence.

152. **Pentas speciosa**, *Baker* [Rubiaceæ]; annua, caule simplici elongato dense pubescente, foliis ternatis breviter petiolatis ovatis acutis membranaceis utrinque pilosis facie viridibus dorso pallide viridibus, internodiis folio multo longioribus, cymis paucifloris terminalibus confertis, bracteis lanceolatis, foliaceis pubescentibus, calycis dentibus, magnis lanceolatis foliaceis, corollæ tubo gracillimo elongato apice abrupte dilatato, limbo pulchre rubello lobis magnis obovatis cuspidatis, antheris in tubo inclusis.

Habitat.—Lake Tanganyika; pool 20 miles south of Niomkoto, *A. Carson* (1888 collection).

Caulis 2–3 pedalis. *Folia* 1½–2 poll. longa. *Dentes* calycini 4 lin. longi. *Corollæ* tubus 15 lin. longus; limbus expansus 15 lin. diam.

Very distinct, with a much larger flower than in *P. carnea*, Benth. in *Bot. Mag.* tab. 4086, or in any other species already known.

153. **Pentas confertifolia**, *Baker* [Rubiaceæ]; perennis, caule simplici erecto pubescente, foliis in verticillis densis confertis sessilibus ascendentibus inæqualibus linearibus vel lanceolatis utrinque viridibus pubescentibus, cymis compositis densifloris terminalibus, bracteis linearibus pilosis, pedicellis brevissimis, ovario piloso globoso, dentibus calycinis parvis lanceolatis, corollæ tubo elongato cylindrico pubescente, limbi lobis brevibus lanceolatis, antheris ex tubo exsertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (23 of 1894 collection).

Caulis sesquipedalis vel bipedalis. *Folia* majora 2–2½ poll. longa, 2–3 lin. lata. *Corollæ* tubus 2 poll. longus, lobi 3 lin. longi.

Near *P. verticillata*, Schum.

154. **Oldenlandia macrodonta**, *Baker* [Rubiaceæ]; annua, caule erecto ramoso pubescente, stipulis membranaceis laciniatis basi breviter connatis, foliis sessilibus linearibus vel lanceolatis facie viridibus glabris dorso obscure pubescentibus, cymis paucifloris terminalibus, calycis dentibus linearibus, corollæ rubellæ tubo cylindrico fauce glabro, lobis oblongis tubo subæquilongis, antheris in tubo inclusis, fructu globoso magnitudine pisi dentibus calycinis persistentibus coronato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (107 of 1894 collection).

Caulis pedalis et ultra. *Folia* majora 2–2½ poll. longa, 2–4 lin. lata. *Dentes* calycini demum 2 lin. longi. *Corollæ* tubus 4 lin longus.

Nearly allied to *O. abyssinica*, Hiern.

155. **Fadogia triphylla**, *Baker* [Rubiaceæ]; perennis, caule erecto simplici glabro, stipulis deltoideis integris, foliis ternatis ascendentibus oblongis obtusis vel cuspidatis basi cuneatis subcoriaceis utrinque viridibus glabris, floribus in cymis paucifloris axillaribus pedunculatis dispositis, pedicellis brevibus erectis, calyce glabro campanulato obscure dentato, corollæ tubo calyce paulo longiori fauce pilosa, lobis ovatis tubo æquilongis, antheris ex tubo exsertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (43 of 1894 collection).

Caulis pedalis. *Folia* 1½–2½ poll. longa, 12–15 lin. lata. *Calyx* 2 lin. longus. *Corollæ* tubus 3 lin. longus.

Nearly allied to *F. glaberrima*, Schweinf. of Djur-land and *F. stenophylla*, Welw. of Angola.

156. **Galium stenophyllum**, *Baker* [Rubiaceæ]; perenne, caulibus erectis gracilibus profunde sulcatis plus minusve pilosis, foliis 6–8-nis anguste linearibus margine recurvatis, floribus terminalibus copiose paniculatis, pedicellis brevibus rectis, floribus parvis albidis rubro tinctis, petalis ovatis acutis, coccis globosis glabris nigris nitidis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (1889 collection, 40, 41 and 80 of 1893 collection). Nyassa land, *J. Buchanan* (770, 1358, 1364 of 1891 collection).

Caulis pedalis vel bipedalis. *Folia* 9–12 lin. longa. *Corolla* expansa 1½ lin. diam. *Cocci* 1 lin. diam.

Belongs to the section *Leiogalia*, near the European *G. lucidum*, All. The numbers cited vary greatly in indumentum and length of pedicel.

157. **Vernonia oocephala**, *Baker* [Compositæ]; fruticosa, ramosissima, ramulis lignosis pubescentibus crebre foliatis, foliis alternis brevissime petiolatis oblongis vel lineari-oblongis obtusis basi rotundatis rigidulis utrinque viridibus pubescentibus, capitulis paucifloris ad apicem ramulorum paucis congestis, involucro oblongo bracteis multiseriatis rigidis pallidis adpressis pubescentibus interioribus oblongis vel lineari-oblongis obtusis exterioribus parvis ovatis, pappi setis rigidis albidis ciliatis, acheniis pubescentibus.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (74 of 1894 collection).

Folia 12–18 lin. longa. *Involucrum* 4½ lin. longum, 2 lin. diam. *Pappus* 2½–3 lin. longus.

Closely resembles in habit the Brazilian *V. nitidula*, Less.

158. **Bojeria vestita**, *Baker* [Compositæ]; herbacea, perennis, caule foliato dense piloso, foliis subcoriaceis crenatis facie viridibus scabris dorso pallide viridibus pilosis inferioribus petiolatis oblongis obtusis basi cuneatis, intermediis sessilibus oblongo-spathulatis amplexicaulibus superioribus parvis oblongis, capitulis paucis magnis corymbosis, involucro campanulato bracteis pauciseriatis lanceolatis adpressis subfoliaceis dense pilosis, achenio cylindrico glabro, pappo albido rigidulo achenio 2–3-plo longiore.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (30 of 1894 collection).

Folia inferiora 8–9 poll. longa, 4–5 poll. lata. *Involucrum* 12–15 lin. diam. *Pappus* 2½ lin. longus.

Habit of *Inula Helenium*. The genus is very near *Inula*. Only two other species are already known, one from Madagascar and the other from the Cape.

159. **Emilia integrifolia**, *Baker* [Compositæ]; perennis, glabra, caule gracili erecto parce foliato, foliis caulinis alternis remotis linearibus integris sessilibus ascendentibus, capitulis paucifloris parvis pluribus laxe corymbosis, pedunculis nudis erectis, involucro oblongo, bracteis circiter 8 æqualibus linearibus viridibus albo marginatis, floribus pulchre purpureis involucro paulo longioribus, receptaculo plano, acheniis glabris brunneis arcte costatis, pappo albo molli achenio duplo longiori.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (102 of 1894 collection). Lower plateau north of Lake Nyassa, *Joseph Thomson*.

Caulis pedalis vel sesquipedalis. *Folia* caulina majora 2–3 poll. longa, 1½–2 lin. lata. *Involucrum* 2 lin. longum. *Achenia* ½ lin. longa.

Near *E. graminea*, DC. *and E. ascendens*, DC., both natives of Madagascar.

160. **Schizoglossum connatum**, *N. E. Brown* [Asclepiadeæ]; caule solitario erecto simplici pubescente, foliis erectis subsessilibus vel breviter petiolatis linearibus acutis marginibus revolutis utrinque pubescentibus, umbellis 6–10 sessilibus lateralibus 6–9-floris, bracteis subulatis cum pedicellis gracilibus calycibusque patule pubescentibus, sepalis patentibus lanceolatis acuminatis, corolla fere ad basin 5-loba lobis lanceolato-linearibus attenuatis erecto-incurvatis apicibusque connatis marginibus replicato-revolutis utrinque pubescentibus, coronæ lobis columnæ staminеæ æquilongis transverse oblongis vel subquadratis apice truncatis, sub-denticulatis angulis exterioribus in dentes breves productis extus basi transverse gibbosis intus bicarinatis et infra apicem cum dente parvo instructis glabris, antheris membranis inflexis suborbicularibus terminatis, stylo apice late truncato leviter 5-gibboso minutissime papilloso.

Habitat.—Fwambo, south of Lake Tanganyika, *Carson* 17.

Caulis 2 ped. altus, ¾–1 lin. crassus. *Foliorum petioli* ½–1 lin. longi, laminæ 2–2½ poll. longæ, ½–1 lin. latæ. *Bracteæ* 1–1½ lin. longæ. *Pedicelli* 1½–2 lin. longi. *Sepala* 1¼–1½ lin. longa. *Corollæ lobi* 3 lin. longi, basi 1 lin. lati. *Coronæ lobi* ¾ lin. longi et lati.

In habit this resembles *S. interruptum*, Schlecht. and *S. angustissimum*, Schum., but is at once distinguished from those and all other known species by the tips of the corolla lobes being connate, as in some species of *Ceropegia* and *Brachystelma*. The flowers appear to be of a greenish-yellow.

161. **Xysmalobium bellum**, *N. E. Brown* [Asclepiadeæ]; caule erecto robusto unifariam puberulo, foliis petiolatis cuneato-oblongis vel oblongis et basi cuneatis apice obtusissimis et minute apiculatis vel acutis utrinque glabris, umbellis plurimis lateralibus vel ad 1–2 terminalibus reductis inferioribus pedunculatis superioribus sessilibus 3–6-floris, pedunculis pedicellisque validis unifariam puberulis, bracteis lanceolatis acuminatis vel subulatis glabris, sepalis ovatis vel ovato-oblongis acutis glabris, corolla magna campanulata fere ad basin 5-loba lobis late oblongis obtusis intus intense purpureis interdum luteo-maculatis extus pallidis utrinque glabris, coronæ lobis supra staminum columnæ basin exortis et columnæ apicem attingentibus vel leviter excedentibus erectis crasso-carnosis turgidis apicibus obtusis vel

introrsim crasso-apiculatis dorso valde convexis ventro planis bicarinatis marginibusque ad apices alato-dentatis, antheris membranis inflexis late ovatis obtusis vel subacutis terminatis, stylo apice late truncato pentagono centro depresso.

Habitat.—East Tropical Africa: Blantyre, *Buchanan* 43; Nyassaland, *Buchanan* 603; Manganja Hills, *Kirk*; Fwambo, S. of Lake Tanganyika, *Carson* 62.

Caulis ultra pedem altus, 1½–3 lin. crassus. *Foliorum petioli* 3–4 lin. longi, laminæ 2–3½ poll. longæ, ¾–1¾ poll. latæ. *Pedunculi* 0–10 lin. longi. *Bracteæ* 2½–4 lin. longa. *Pedicelli* ¾–1¼ poll. longi. *Sepala* 3½–4½ lin. longa, 2 lin. lata. *Corollæ lobi* 10–13 lin. longi, 5½–7 lin. lati. *Coronæ lobi* 1¾–2 lin. longi. *Staminum columna* 3 lin. longa.

This is similar to *X. spathulatum*, Schum. in general appearance, but the flowers are larger, the coronal lobes reach to the top of the column or slightly overtop it and are different in form.

162. **Asclepias amabilis**, *N. E. Brown* [Asclepiadeæ]; caule gracili erecto simplici sparse puberulo vel subglabro, foliis erectis sessilibus vel subsessilibus linearibus acutis marginibus revolutis scaberulis, umbellis 2–3 pedunculatis 5–6 floris, pedunculis pedicellisque unifariam puberulis, bracteis subulatis, sepalis lanceolatis vel ovato-lanceolatis acutis puberulis ciliolatis, corolla rotata fere ad basin 5-loba lobis late ovatis acutis extus minute et sparse puberulis pallide purpureis intus glabris albidis, coronæ lobis paulo supra staminum columnæ basin exortis et columnæ apicem attingentibus cucullato-complicatis truncatis cum dentibus parvis erectis ad angulos interiores intus ecornutis basi truncatis, antheris membranis inflexis ovatis obtusis terminatis, stylo apice depresso-truncato pentagono.

Habitat.—East tropical Africa, Fwambo, S. of Lake Tanganyika, *Carson*, 35, 55.

Caulis 1–1½ ped. altus, ¾–1 lin. crassus. *Folia* 1½–3 poll. longa, ½–1¼ lin. lata. *Pedunculi* ½–2¼ poll. longi. *Bracteæ* 2–3 lin. longæ. *Pedicelli* 8–12 lin. longi. *Sepala* 2–2⅓ lin. longa. *Corolla* 9–10 lin. diam., lobis 4–4½ lin. longis, 2½ lin. latis. *Coronæ lobi* 1¼ lin. longi. *Staminum columna*, 1½ lin. longa.

163. **Tachiadenus continentalis**, *Baker* [Gentianeæ]; herbaceus, perennis, glaber, caulibus gracilibus erectis simplicibus vel furcatis, foliis oppositis sessilibus parvis ascendentibus lanceolatis vel oblongo-lanceolatis, calycis segmentis oblongo-lanceolatis acuminatis dorso carinatis, corollæ albidæ tubo cylindrico calyce 2–3-plo longiori, limbi lobis ovatis valde imbricatis, genitalibus in tubo inclusis, staminibus supra medium tubi insertis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (33 of 1894 collection).

Caulis pedalis et ultra. *Folia* 6–9 lin. lata. *Calyx* 6–9 lin. longus. *Corollæ* limbus expansus 2 poll. diam.

Adds this fine genus, hitherto supposed to be confined to Madagascar, to the Continental flora. Nearly allied to *T. gracilis*, Griseb.

164. **Ipomœa (Orthipomœa) tanganyikensis**, *Baker* [Convolvulaceæ]; perennis, caulibus subrectis pubescentibus, foliis breviter petiolatis oblongis obtusis integris facie viridibus pilis paucis longis adpressis

vestitis dorso dense persistenter albo-sericeis, floribus pluribus in capitulo longe pedunculato aggregatis, bracteis parvis linearibus, sepalis lanceolatis pilis hispidis densissime vestitis, corollâ rubra infundibulari calyce duplo longiori.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (73 of 1894 collection). Also collected 20 years ago by Captain Lovett Cameron.

Folia 2–3 poll. longa, 6–12 lin. lata. *Calyx* 3 lin. longus.

Nearly allied to the West African *I. amœna*, Choisy.

165. **Buchnera quadrifaria**, *Baker* [Scrophularineæ]; annua, caulibus gracillimis erectis tetragonis glabris, foliis caulinis paucis minutis linearibus sessilibus strictis erectis, spicis 1–4 densissimis oblongis vel cylindricis tetragonis, bracteis late ovatis acutis rigidis glabris imbricatis quadrifariis, calyce glabro rigidulo bractea breviori, dentibus lanceolatis, corollæ tubo cylindrico bractea multo longiori, limbi lobis patulis oblongis basi cuneatis, genitalibus in tubo inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (100 of 1894 collection). Lower plateau north of Lake Nyassa, *Joseph Thomson*).

Caulis pedalis vel sesquipedalis. *Folia* 2–3 lin. longa. *Racemus* 9–18 lin. longus, bracteis 1½ lin. longis et latis. *Corollæ* tubus 5–6 lin. longus, limbus 3–4 lin. diam.

Very distinct by its slender rigid nearly naked stems and quadrifarious bracts.

166. **Clerodendron (Euclerodendron) tanganyikense**, *Baker* [Verbenaceæ]; fruticosum, erectum, caulibus dense pubescentibus, foliis oppositis breviter petiolatis oblongis cuspidatis subintegris facie viridibus subglabratis dorso pallide viridibus dense pubescentibus, cymis paucis axillaribus et in paniculam terminalem aggregatis, ramulis pedicellisque dense pubescentibus, bracteis lanceolatis minutis, calyce pubescente tubo oblongo dentibus parvis ovatis, corollæ tubo calyce duplo longiori, limbo parvo lobis orbicularibus, staminibus limbo duplo longioribus.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (52 of 1894 collection).

Folia 3–4 poll. longa, medio 2–2½ poll. lata. *Panicula* terminalis 2 poll. diam. *Calyx* 2 lin. longa. *Corollæ* limbus 3 lin. diam.

Takes rank amongst the small flowered species, near the Kilimanjaro *C. Johnstoni* Oliv. in *Trans. Linn. Soc.*, ser. 2, Bot. II., 346.

167. **Pycnostachys verticillatus**, *Baker* [Labiatæ]; herbaceus, perennis, caulibus ramosis pubescentibus, foliis parvis petiolatis verticillatis linearibus vel lanceolatis dentatis utrinque viridibus pubescentibus, racemis densissimis cylindricis, bracteis parvis ovatis, calyce piloso tubo brevissimo dentibus rigidis linearibus, corollæ tubo e calyce breviter exserto, labiis parvis, superiori oblongo, inferiori valde concavo, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (38 of 1894 collection).

Caulis 2–3-pedalis. *Folia* 6–9 lin. longa, 1–4 lin. lata. *Racemus* 6 lin. diam. *Calycis* dentes demum ¾–1 lin. longi. *Corolla* 3 lin. longa.

A smaller-flowered species than *P. parvifolius*, with longer racemes and shorter calyx-teeth.

168. **Pycnostachys parvifolius**, *Baker* [Labiatæ]; herbaceus, perennis, caulibus ramosis dense pubescentibus, foliis sessilibus oppositis vel pseudo-verticillatis parvis integris linearibus vel lanceolatis dense pubescentibus facie sordide viridibus dorso pallidioribus, racemis densissimis oblongis vel subglobosis, bracteis parvis linearibus, calyce piloso tubo brevissimo dentibus rigidis lineari-subulatis, corollæ tubo decurvato e calyce longe exserto, labio superiori parvo angusto, inferiori majori valde concavo, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (26, 34, 92, 103, of 1894 collection).

Caules sesquipedales vel bipedales. *Folia* majora 6–9 lin. longa. *Calycis* dentes demum 1½ lin. longi. *Corolla* 6–9 lin. longa.

A very distinct species, with leaves like those of the common Lavender, and much more capitate racemes than any of those previously known.

169. **Orthosiphon Cameroni**, *Baker* [Labiatæ]; perennis, caulibus erectis gracilibus dense pilosis, foliis paucis sessilibus lanceolatis obscure dentatis utrinque viridibus pilosis, racemis laxissimis, simplicibus, verticillastris paucifloris, bracteis minutis deciduis, pedicellis brevibus, calyce piloso tubo campanulato, dente superiori suborbiculari tubo breviori infimis parvis setaceis, corollæ tubo calyce duplo longiori labio inferiori obovato superiori multo majori, staminibus longe exsertis.

Habitat.—Lake Tanganyika, *A. Carson* (81 of 1893), and collected also 20 years ago in his journey across the continent by Captain Lovett Cameron.

Caulis sesquipedalis. *Folia* 2–3 poll. longa, 3 lin. lata. *Calyx* floriferus 3 lin. longus. *Corolla* 7–8 lin. longa.

Remarkable in the genus for its much-exserted stamens.

170. **Plectranthus betonicæfolius**, *Baker* [Labiatæ]; herbaceus, perennis, caule tenuiter albo-incano, foliis paucis longe petiolatis ovatis distincte crenatis facie viridibus tenuiter incanis dorso albo-incanis, pedunculo nudo elongato, racemis densis simplicibus cylindricis axi dense piloso, bracteis ovatis cuspidatis, calyce parvo dense persistenter purpureo-lanoso dentibus subæqualibus deltoideis, corollæ pubescentis tubo calyce multo longiori dimidio superiori late infundibulari, labio superiori parvo, inferiore magno valde concavo, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (64 and 79 of 1894 collection).

Caulis bipedalis et ultra. *Folia* inferiora 1½–2 poll. longa. *Racemus* 3 poll. longus. *Calyx* 1 lin. longus. *Corolla* 6–7 lin. longa.

171. **Plectranthus modestus**, *Baker* [Labiatæ]; annua, caulibus gracilibus erectis ramosis pubescentibus, foliis paucis sessilibus lanceolatis distincte crenatis utrinque viridibus glabris, racemis laxis simplicibus, verticillastris 2–3–floris, bracteis minutis, pedicellis calyce longioribus, calyce pubescente tubo campanulato dente supremo orbicu-

lari reliquis angustis acutis, corollæ tubo calyce duplo longiori, labio superiori parvo, inferiori magno concavo, staminibus inclusis.

Habitat.—Tanganyika plateau, *A. Carson* (1889 collection).

Caulis vix pedalis. *Folia* majora 1½–2 poll. longa. *Calyx* primum 1½ lin., fructiferus 4 lin. longus. *Corolla* 6 lin. longa.

Belongs to the section *Germanea*, and to series with cymes congested into umbels, so as to form a simple raceme.

172. **Plectranthus subacaulis**, *Baker* [Labiatæ]; perennis, foliis radicalibus pluribus sessilibus oblongis obtusis ad basin sensim angustatis utrinque viridibus glabris nigro-punctatis, caulibus brevibus simplicibus vel furcatis, foliis caulinis parvis bracteiformibus, floribus in spicis simplicibus subdensis dispositis, bracteis linearibus persistentibus foliaceis, calyce campanulato ore truncato, corolla pubescente tubo calyce multo longiori dimidio inferiori cylindrico dimidio superiori dilatato, labio inferiori parvo oblongo concavo superiori parvo recurvato, staminibus inclusis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (33 and 65 of 1893 collection).

Caulis 5–6 poll. longus. *Folia* radicalia 3–4 poll. longa, 9–12 lin. lata. *Calyx* ½ lin. longa. *Corolla* 4 lin. longa.

Very abnormal by its spicate inflorescence, truncate calyx, and corolla tube longer than the calyx; also by its sub-acaulescent habit. Perhaps it should rank as a new genus.

173. **Moræa ventricosa**, *Baker* [Irideæ]; caule elongato monocephalo, folio unico basali producto lineari glabro rigidulo venis conspicuis, foliis superioribus bracteiformibus caulem vaginantibus, spathæ valvis magnis oblongis acutis, interiori exteriori multo longiori, pedicellis spatha brevioribus, ovario cylindrico, perianthio pallide luteo, tubo abortivo, segmentis omnibus obovatis obtusis longe unguiculatis, exterioribus reflexis, interioribus paulo brevioribus erectis, stigmatis appendicibus magnis oblongis.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (37 of 1894 collection).

Cormus ignotus. *Caulis* sesquipedalis. *Folium* productum bipedale, 3 lin. latum. *Spathæ* valva interioris 4–4½ poll. longa, 9–12 lin. lata., *Perianthium* 2 poll. longum, segmentis omnibus supra medium 6–7 lin. latis.

Nearly allied to the Cape *M. spathacea*, Ker.

174. **Gladiolus oligophlebius**, *Baker* [Irideæ]; caule gracili elongato, foliis productis circiter 5 linearibus elongatis glabris graminoideis venis paucis remotis, spicis laxis simplicibus paucifloris, spathæ valva exteriori oblongo-lanceolata firma viridula, perianthio magno pallide rubello, tubo brevi infundibulari, lobis oblongo-lanceolatis acutis subæquilongis, staminibus limbo distincte brevioribus.

Habitat.—Abercorn, Lake Tanganyika, *Carson* (25 of 1893 collection).

Cormus ignotus. *Caulis* sesquipedalis. *Folia* pedalia et ultra, 4–5 lin. lata. *Spathæ* 18–21 lin. longæ. *Perianthii* tubus 9–12 lin. longus; lobi 2–2½ poll. longi.

Near *G. angustus*, Linn., and *G. Grantii*, Baker.

175. **Gladiolus caudatus,** *Baker* [Irideæ]; caule gracili elongato, foliis productis 4–5 elongatis linearibus glabris graminoideis, spicis laxis simplicibus paucifloris, spathæ valva exteriori oblongo-lanceolata firma viridula, perianthio pallido rubro tubo brevi infundibulari, lobis oblongis insigniter caudatis superioribus multo majoribus, staminibus limbo distincte brevioribus.

Habitat.—Fwambo, Lake Tanganyika, *Carson* (19 of 1893 collection).

Cormus ignotus. *Caulis* pedalis vel sesquipedalis. *Lamina* folii 6–12 poll. longa, 2–3 lin. lata. *Spathæ* 12–18 lin. longæ. *Perianthii* tubus 6–8 lin. longus; lobi superiores 2 poll. longi.

Allied to *G. angustus*, Linn., and *G. cuspidatus*, Jacq.

176. **Gladiolus gracillimus,** *Baker* [Irideæ]; cormo parvo globoso apice cancellato inferne fibris crassis parallelis vestito, caule stricto erecto gracillimo, foliis remotis longe vaginantibus superioribus lamina libera brevi lineari-subulata præditis, spicis simplicibus laxis secundis paucifloris, spathæ valva exteriori oblonga albo-viridi obtusa vel cuspidata, perianthio parvo lilacino, tubo brevi infundibulari, lobis oblongis acutis tubo duplo longioribus inferioribus superioribus longioribus, staminibus limbo distincte brevioribus.

Habitat.—Fwambo, Lake Tanganyika, *Carson* (118 of 1893 collection).

Cormus semipollicaris. *Caulis* pedalis vel sesquipedalis. *Lamina* producta folii superioris 2–3 poll. longa. *Spicæ* 2–3 poll. longæ. *Spathæ* 4–6 lin. longæ. *Perianthium* pollicare.

A very slender small-flowered species, allied to the Cape *G. gracilis*, Jacq.

177. **Gladiolus tritonioides,** *Baker* [Irideæ]; caule elongato, foliis 3–4 remotis inferioribus caulem vaginantibus superioribus lamina lineari brevi rigida producta, spicis laxis paucifloris simplicibus vel furcatis, spathæ valva exteriori ovato-lanceolata albo-brunnea interiori pallida obtusa membranacea, perianthio saturate purpureo, tubo brevi infundibulari, lobis ovatis acutis subconformibus tubo duplo longioribus, staminibus limbo distincte brevioribus.

Habitat.—Fwambo, Lake Tanganyika, *Carson* (37 of 1893 collection).

Cormus ignotus. *Caulis* 1½–2 pedalis. *Lamina* producta folii superioris 3–4 poll. longa. *Spica* 3–4 poll. longa. *Spathæ* 8–12 lin. longæ. *Perianthii* tubus 6 lin. longus; lobi pollicares.

Connects *Gladiolus* and *Tritonia*. Of the species of the former genus it looks most like *G. brevifolius*, Jacq.

178. **Gloriosa Carsoni,** *Baker* [Liliaceæ]; caulibus erectis crebre foliatis, foliis amplexicaulibus oblongo-lanceolatis apice acuminatis haud cirrhiferis, floribus pluribus laxe corymbosis, pedunculis nudis elongatis ascendentibus, perianthio cernuo splendide rubro segmentis arcte reflexis vix crispis oblongo-oblanceolatis unguiculatis apice acuminatis recurvatis margine luteis, staminibus patulis perianthio duplo brevioribus, stylo erecto vel arcuato apice stigmatoso breviter trifurcato.

Habitat.—Fwambo, Lake Tanganyika, *A. Carson* (53 of 1894 collection).

Caulis sesquipedalis. Folia superiora 4–5 poll. longa. *Perianthium* 2½ poll. longum, segmentis supra medium 6 lin. latis.

A very distinct novelty, with flowers like those of the finest forms of *G. virescens*, Lindl., but style not deflexed at the base, stem short and erect, and leaves not cirrhose at the tip. It would make a handsome garden plant.

179. **Tristachya decora**, *Stapf* [Gramineæ]; panicula ovata vel oblonga, interdum secunda, ramis gracilibus ad medium vel ultra erectis deinde abrupte patulis vel deflexis ad et supra curvaturam setis albis inæquilongis e tuberculis atris ortis dense barbatis, spicularum capitulis sub anthesi ovatis, gluma I. lanceolata caudato-acuminata secundum nervos setis vel setarum fasciculis e tuberculis atris ortis albis patulis vel deflexis ornata, gluma II. ovato-lanceolata longe acuminata glabra, gluma III. præcedenti simili setis utrinque 2 vel 3 brevibus exceptis glabra, ejus palea anguste oblonga applanata, gluma IV. oblongo-ovata basi utrinque fasciculo pilorum et ad medium serie obliqua fasciculorum ornata, ejus palea lanceolata acuta carinis cristatis inferne conniventibus canaliculum includentibus.

Habitat.—Fwambo, Tanganyika, A. Carson, 36.

Panicula 4–6 poll. longa, 2–3 poll. lata. *Capitula* (aristis exceptis) 9 lin. longa, 3–4 lin. lata. *Gluma* I. 9 lin. longa, setæ 3–4 lin. longæ; gluma I. et II. 6–7 lin., IV. 4 lin. longa; arista ad genu 4 lin., tota 10 lin. longa.

This species is nearest allied to *T. leucothrix*, Trin., a species known from Natal and the eastern part of the Cape Colony. It differs from it mainly in the smaller and broader heads of spikelets, the very long and stiff bristles of glume 1, the glabrous or almost glabrous glumes 2 and 3, the peculiar arrangement of the hairs of glume 4, and the shorter awns. Glume 1 is rather firm and light brown, whilst the tubercles from which the white bristles spring are of a pure black. The second and third glumes are yellowish brown, with green and prominent nerves. The fourth glume is much paler, and the nervation less marked. There are no leaves with the specimens except one sheath. It is glabrous, and bears at the mouth a dense line of short white hairs which represent the ligula.

CCCCLII.—MISCELLANEOUS NOTES.

Her Majesty the Queen has been graciously pleased to allow the fences excluding the public from the Palace Meadow to be removed. This piece of ground is about 4½ acres in extent and when thrown open it will allow visitors a direct, instead of a circuitous, access to the finest part of the Arboretum.

The Royal Gardens are 251 acres in extent. It is not generally understood that they were originally the private property of the Crown, and not acquired out of public funds. The building used for the Herbarium and Library was sold to the nation by George IV. Access to the remainder has been step by step conceded to the public by the liberality and munificence of Her Majesty the Queen.

The successive stages may be briefly enumerated :—

The Botanic Garden, of which Sir William Hooker was appointed Director in 1841, comprised about 11 acres.

To this was almost immediately (1842) added between 3 and 4 acres about No. I. house, and the orangery (now No. III. Museum).

Soon after (1844), by permission of the Queen, 47 acres, including the piece of water in front of the Palm House, were added from the Pleasure Grounds for the formation of a Pinetum.

In 1846 the Royal Kitchen Gardens (14 acres) were abolished ; a third of their area (about 5 acres), called Methold's Garden (it having originally belonged to Methold House, the Director's present official residence), was at once added to the Botanic Garden ; another third abutting on the Richmond Road is now represented by the Herbaceous ground and the Propagating yard for the purpose of which many of the then existing fruit houses are still in use.

In 1851, the intervening third, the Kitchen Garden and Paddock, in the occupation of the King of Hanover, reverted to the Crown, and was added by the Queen to the Botanic Garden. The Pleasure Grounds and Gardens at Kew were in the occupation of the King of Hanover for sporting purposes at the time the Botanic Garden was given to the nation. The woods were filled with rough scrub for cover.

9th July 1845 they were placed in the charge of Sir William Hooker by the Woods and Forests. The intention was that they should be formed into a National Arboretum. A plan for the purpose was prepared (1846) by W. A. Nesfield ; the main features were carried out at the time, and the general principle has been worked upon ever since.

30th March 1864 the Aboretum was finally thrown open to the public every day of the year except Christmas Day.

The following letter records the terms on which Her Majesty the Queen has been pleased to grant the further concession of access to the Palace Meadow.

BOARD OF GREEN CLOTH to HER MAJESTY'S OFFICE OF WORKS.

Board of Green Cloth,
Buckingham Palace, S.W.,
February 15, 1895.

SIR,

IN accordance with the representations made to the Lord Steward on various occasions by the First Commissioner of Works, that access to the Meadow in front of Kew Palace would greatly improve the arrangements for admitting the public to Kew Gardens, I have recently taken Her Majesty's pleasure on this point, and am honoured by the Queen's commands to intimate to you Her Majesty's consent to cede to your Department, for the use of the public, the greater part of the Meadow in question under the conditions which have been discussed and practically agreed to between the two Departments, viz., that the Office of Works will erect proper fencing to limit the admission of the public, that the arrangement shall in no way prejudice the rights of the Crown to deal in any manner it may deem fit with the land thus ceded or any part of it, but shall be considered one strictly at the pleasure of the Crown and terminable by it at any time ; also that the Department of Works will undertake to keep in suitable condition all the grounds attached to Kew Palace, and will further cause to be kept in order and properly thinned the trees, shrubberies, and paths in the grounds attached to the Queen's Cottage in Kew Gardens.

I further concur in the proposal as shown by plan as to the fencing in Kew Meadow, prepared by your Department, with reference to the foregoing arrangement, as forwarded in the letter from your Department of the 4th instant.

Yours truly,
(Signed) BREADALBANE,
Lord Steward.

The Right Hon.
Herbert J. Gladstone, M.P.,
First Commissioner of Works, &c.

Notizblatt des Königlichen botanischen Gartens und Museums zu Berlin.—Berlin has paid Kew the compliment of establishing an organ on the same lines and for the same purposes as the *Kew Bulletin*; that is to say, for recording noteworthy events in the establishments which would otherwise attract little attention; for publishing the novelties in small collections that are constantly arriving, and for developing a more intimate connexion between the home and colonial botanical and horticultural institutions. The first number contains a list of the most noteworthy plants recently introduced into the Berlin garden; experiments in raising and cultivating plants, and consignments to the colonies; notes on plants cultivated in the colonies; diagnoses of new plants, and miscellaneous notes. The prompt publication of information of this kind can only result in benefit to similar establishments in other countries and the advancement of botanical science and enterprise in the world.

Botanical Magazine.—The number for February contains figures of several plants of unusual interest. *Musa Hillii*, a native of Queensland, was previously imperfectly known. Mr. F. M. Bailey, Colonial botanist, sent seed to Kew in 1889, and a plant raised from them flowered in the Palm House in December 1893, but did not set fruit. Quite recently, but too late for the *Magazine*, fruit has been produced. It is bright red, globose in shape, about an inch and a half in diameter, and altogether unlike an ordinary banana. *Aphærema spicata* is a monotypic herbaceous member of the *Samydaceæ*, and a native of Brazil. It was first collected by Mr. J. Weir, 1861–2, and recently re-discovered by Dr. Fritz Mueller. It was raised from seed sent from the Copenhagen Botanic Garden. *Richardia Pentlandii*, a native of Basutoland, is remarkable for the large size of its cordate leaves and the deep yellow of its spathes. It was drawn from a plant, one of several grown from tubers brought to Kew by Mr. E. E. Galpin in 1892. *Aloe brachystachys*, sent to Kew by Sir John Kirk from Zanzibar in 1884, is a new arborescent species allied to *A. abyssinica*, which flowered for the first time in January 1894. The remaining plant figured is *Cephalanthus natalensis*, a species having a wide range in South-eastern Africa, and interesting as being the only African member of a genus represented by several species in Eastern Asia and North and South America. It is a pretty, though not a showy shrub, and was raised at Kew from seed presented by Mr. W. J. Horn.

Mr. Scott-Elliot's Ruwenzori Expedition.—*Nature* for November 5, 1891, gave an account, rescued from an American periodical, of the botanical results, slender enough it is true, but not without interest, of the Emin Relief Expedition, as described by Major Jephson. This was based on a small collection brought by Lieutenant Stairs from "a high altitude on the slopes of Ruwenzori or the Mountains of the Moon."

In 1893 Mr. Scott-Elliot, an accomplished botanist and distinguished African traveller, submitted to the Government Grant Committee of the Royal Society a scheme for an extended plan of botanical exploration in Central Africa. On the advice of the Board for Botany, Mr. Scott-Elliot undertook the investigation of Ruwenzori, and through the kind aid of Sir John Kirk, such official facilities as were possible were obtained on his behalf.

A letter dated Ruwenzori, May 21, 1894, was published in *Nature* for October 4 of that year. It raised a high expectation that Mr. Scott-Elliot would succeed in thoroughly investigating the flora of this interesting region.

Mr. Scott-Elliot is now on his way home, and the following letter is the latest intelligence which has been received from this intrepid traveller.

Some account of Ruwenzori on which Mr. Scott-Elliot had spent four months is given by himself in *Nature* for January 17, 1895, in a letter dated August 2 of the preceding year.

Mandala, Shire Highlands,
6 December 1894.

DEAR SIR,

I THINK I should report to you as to my movements since leaving Ruwenzori. I was obliged to start south owing to my supply of cloth running short and the impossibility of feeding my men.

I thought it would be too foolhardy to attempt to cross Ruanda, of which I had very bad reports from everyone, so determined to pursue my original plan of trying to see if the Kagera river was navigable. I therefore crossed Mpororo and followed this river from the point where it turns eastward until I thought that I was on the latitude of Tanganika. I then went across Urundi towards the lake which I reached after great difficulty with the natives (my caravan consisted of 40 men of whom one was killed by the Warundi). I then came down Tanganika by Arab dhows to Abercorn, crossed the Stevenson Road and came down to Matope on the upper shore by steamer and boat. I was obliged to give up my original idea of visiting the Livingstone Mountains on account of blindness, the result of Tanganika fever and a slight attack of dysentery. It is only during the last few days that my eyes have recovered sufficiently to enable me to botanise, and I have been reduced to trusting to natives for specimens. My collection now consists of about 2,300 numbers of herbarium specimens. I also have a fair number of insects, a few bird skins, small mammals, amphibia, and fish in spirit (of which I could only carry a very small amount), geological specimens and photographs. I have also made a map of my route from Ruwenzori to Tanganika which is chiefly over as new ground as Ruwenzori itself.

I propose to stay here a fortnight and then return home as my health is not completely recovered and my expenses are becoming very heavy indeed.

I hope my collections will reach home in good condition; I am trying to keep them with me but have thought it best to send them to Chiroma at present as the rains are coming on and I wish to botanise on Milanje.

I am, &c.

(Signed) G. F. SCOTT-ELLIOT.

The President,
Government Grant Committee,
Royal Society.

Malayan Plants.—Dr. G. King has sent another parcel of plants representing the novelties of the continuation of his *Materials for a Flora of the Malay Peninsula*. These are chiefly *Meliaceæ*, which are very numerous in the peninsula; but there are also many other novelties belonging to the neighbouring families. Altogether there are about 350 sheets of specimens.

Flora of Florida.—The first instalment of Mr. G. V. Nash's Florida herbarium, comprising some 700 species, has been purchased. The specimens are excellent, and were collected in the vicinity of Eustis in Lake County.

Castleton Gardens, Jamaica.—The *Bulletin* of the Botanical Department, Jamaica, for October—December, 1894, contains very interesting notes on the plants cultivated in the Botanic Gardens at Castleton. This serves both as a guide to the gardens and affords useful information on the plants themselves. A plan is added, showing where the plants may be found. These gardens were established about 30 years ago in a picturesque valley in the mountains between Kingston and Annotto Bay. They are 19 miles from Kingston, but, as Mr. Fawcett remarks, "the drive there and back more than compensates for the distance." The scenery along the banks of the Wag-water river is probably the most characteristic and beautiful of any in the island. The elevation is 580 feet, with an annual mean temperature of 76° Fah. The annual rainfall is about 110 inches.

The chief feature of the garden is undoubtedly its fine collection of palms. These thrive exceedingly well in the moist part of the locality. There are the Sugar-palm (*Arenga saccharifera*), Tucum-palm (*Astrocaryum vulgare*), Cohune-palm (*Attalea Cohune*), Jamaica Ippi-appi (*Carludovica gracilis*), Wax-palm (*Copernicia cerifera*), Æta-palm (*Mauritia flexuosa*), Ivory-palm (*Phytelephas microcarpa*), Jupati-palm (*Raphia tædigera*). Of flowering plants *Amherstia nobilis* has long been established; *Beaumontia grandiflora* forms large festoons across the garden paths, while others such as *Bignonia magnifica*, species of *Bauhinia*, *Colvillea racemosa*, *Dillenia indica*, *Mesua ferrea*, *Michelia Champaca*, *Napoleona imperialis*, *Spathodea campanulata*, *Victoria regia* are very luxuriant and attractive. The Mangosteen (*Garcinia Mangostana*) fruited for the first time in Jamaica at Castleton in 1886. With Economic plants the Castleton Gardens are well supplied. They serve as an excellent centre for the propagation and distribution of such plants on the north side of the island, and large quantities are also sent to the Hope Gardens and to Kingston.

The three best known rubber trees, viz., Para-rubber (*Hevea brasiliensis*), Central American rubber (*Castilloa elastica*), and Ceara rubber (*Manihot Glaziovii*) have been established for more than 12 years, and have borne crops of seeds. A very successful plot of Liberian coffee has been a prominent feature since 1880, and large quantities of seed are annually distributed in the island. Mr. Fawcett anticipates that the export of coffee from Jamaica ought soon to be doubled.

West African Mahogany.—An article on West African mahogany (*Khaya senegalensis*) was published in the *Kew Bulletin*, 1890, p. 168. A further article (*Kew Bulletin*, 1894, p. 8) showed that the timber of several other trees supplied the African mahogany now in commerce. Mr. James Irvine, of Liverpool, was good enough to furnish notes giving the following native names for different kinds of mahogany exported from West Africa: "Papáo," "Bako," "Dubin," "Kwabaha," "Chire-ahkama," and "Odum." Odum or Iroko (*Kew Bulletin*, 1891,) is *Chlorophora excelsa*, Benth. Of the botanical identity of the other timbers we have no authentic information.

The African mahogany trade was started as lately as 1886. Already it has assumed such proportions (12,000 tons annually) that it has seriously affected the important mahogany industries of British Honduras and other countries. African timber is even finding its way into the New World. The following note on this point has appeared in *Garden and Forest* for January 30, 1895, p. 50:—

"The *Southern Lumberman* says that mahogany logs from the west coast of Africa have got as far as Louisville, Kentucky, and adds that it is much cheaper than the mahogany from Central America and Cuba. From these mahogany forests in Africa it is said that twelve million feet of lumber have already been cut and exported, and they promise to yield an immense revenue to the British and French colonists who have seized upon the territory. The wood has a tinge of pink in contrast with the somewhat reddish colour of the American variety, and some of the squared logs which have been imported are two by three and a half feet in size. We may add that some of this African mahogany is the wood of *Khaya senegalensis*, a tree which belongs to the same family as the true mahogany, and is closely related to it. It is not so desirable a cabinet-wood as the Mexican or Cuban mahogany, but is more like the Central American wood. Occasionally there are logs richly figured, and these have been manufactured here into very attractive veneering."